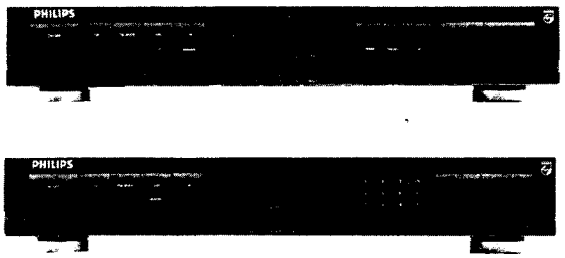
Tuner 70FT650/00R/05R

70FT670/00R/05R



Service Manual

FT650/00R/05R
FT670/00R/05R

TABLE OF CONTENTS **page**

Specification	1
Connections and controls	2
Service routine	3,4,5,6,7
Semiconductor layout	8
Adjustment location, standard symbol list	9
Adjustments	10,11
Wiring diagrams (FT650)	12,13,24,25
Schematic diagrams (FT650)	14,15,16,22,23
Schematic diagrams (FT670)	17,18,19,26,27
Wiring diagrams (FT670)	20,21,28,29
Exploded view, list of mechanical parts (FT650, FT670)	30
List of electrical parts	31

(GB)
Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified be used.

(NL)
Veiligheidsbepalingen vereisen, dat het apparaat in zijn oorspronkelijke toestand wordt teruggebracht en dat onderdelen, identiek aan de gespecificeerde worden toegepast.

(D)
Bei jeder Reparatur sind die geltenden Sicherheitsvorschriften zu beachten. Der Originalzustand des Geräts darf nicht verändert werden für Reparaturen sind Original-Ersatzteile zu verwenden.

(I)
Le norme di sicurezza esigono che l'apparecchio venga rimesso nelle condizioni originali e che siano utilizzati pezzi di ricambiago identici a quelli specificati.

(F)
Les normes de sécurité exigent que l'appareil soit remis à l'état d'origine et que soient utilisées les pièces de rechange identiques à celles spécifiées.

Documentation Technique Service Dokumentation Documentazione di Servizio Huolte-Ohje Manual de Servicio Manual de Serviço

"Pour votre sécurité, ces documents doivent être utilisés par des spécialistes agrées, seuls habilités à réparer votre appareil en panne".

Subject to modification (GB) (NL) 4822 725 22439 (F) (D) (I)

Printed in The Netherlands

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PHILIPS

Published by Service Consumer Electronics

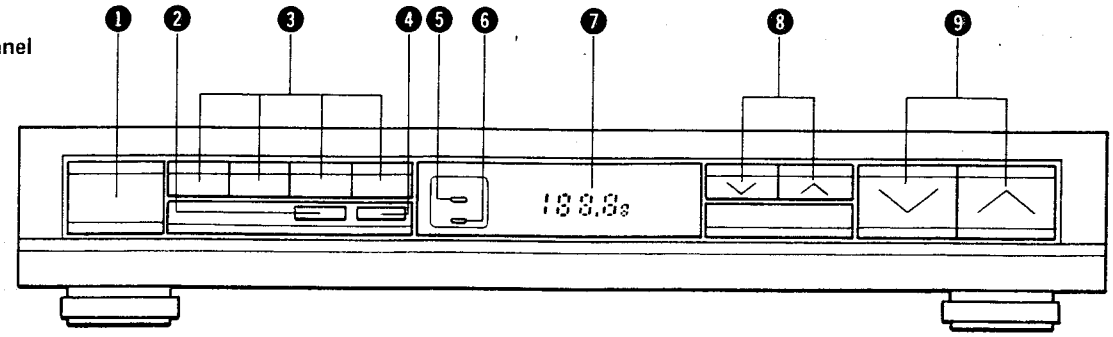
SPECIFICATION (FT650, FT670)

General		Nominal value	Typical value
Mains voltage		: 220 – 240V ~	: 220 – 240V
Mains frequency		: 50 – 60 Hz	: 50 – 60 Hz
Power consumption		: 10W max	: 10W max
Dimensions (WxHxD)		: 420 x 60 x 260 mm	: 420 x 60 x 260 mm
Weight		: 3.0 kg	: 3.0 kg approx.
Tuner: FM section (at 75Ω)			
Tuning range		: 87.5 MHz to 108.0 MHz	: 87.5 MHz to 108.0 MHz
Aerial inputs		: 75Ω coaxial	: 75Ω coaxial
		: 300Ω symmetrical	: 300Ω symmetrical
Sensitivity	mono	: 2.0 μV 3% Distortion (75 kHz dev.)	: 1.3 μV 3% Distortion (75 kHz dev.)
Selectivity		: 50 dB at ±300 kHz bandwidth	: 60 dB at ±300 kHz bandwidth
Frequency response	30 Hz – 15 kHz	: +1.0, –4.0 dB	: +0.5, –2.0 dB
Suppression	IF-AM	: 70 dB –45 dB	: 80 dB –55 dB
	pilot tone	: 40 dB	: 50 dB
	image frequency	: 65 dB	: 75 dB
Channel separation		: 30 dB 1 kHz	: 40 dB 1 kHz
Distortion T.H.D	mono	: 0.4%	: 0.2%
	stereo	: 1.0%	: 0.5%
Signal/noise ratio	mono	: 71 dB	: 76 dB
	stereo	: 63 dB	: 68 dB
Autom-stop threshold (Muting)		: 4 – 9 μV	: 6 μV
Output		: 350 – 800 mV ⩽ 3.3 kΩ	: 500 mV
Tuner: AM section			
Wave ranges	MW	: 531 kHz to 1602 kHz	: 531 kHz to 1602 kHz (565–187m)
	LW	: 152 kHz to 282 kHz	: 153 kHz to 281 kHz (1960–1067m)
Sensitivity	MW	: 30 μV 10% Distortion	: 15 μV 10% Distortion
	LW	: 300 μV 10% Distortion	: 200 μV 10% Distortion
Selectivity	(Loop antenna)	: 20 dB at ±9 kHz bandwidth	: 30 dB at ±9 kHz bandwidth
Suppression	IF (Loop antenna)	: 50 dB	: 60 dB
	image frequency (Loop antenna)	: 35 dB	: 40 dB
Output	(Loop antenna)	: 200 – 400 mV ⩽ 3.3 kΩ	: 280 mV
Tuner: Digital section			
Tuning steps	FM/MW/LW	: 50 kHz/9 kHz/1 kHz	: 50 kHz/9 kHz/1 kHz
Presets	FM+MW+LW	: 30 random sequential	: 30 random sequential

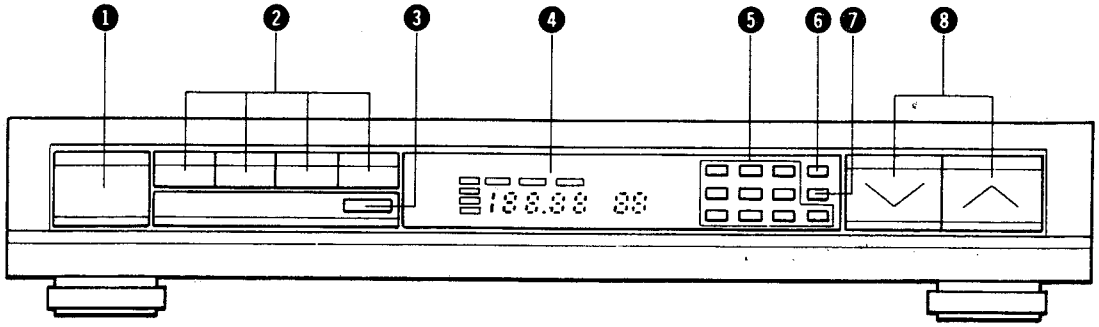
Caution ⚡ 220V/240V

Removal of upper cabinet exposes the protruding current-carrying parts of mains switch and mains transformer, therefore extreme care should be taken when the apparatus is connected to the mains.

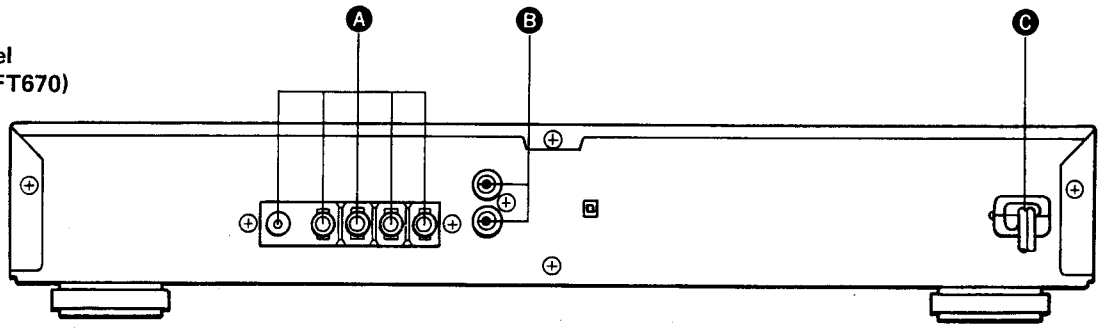
Front Panel
(FT650)



(FT670)



Rear Panel
(FT650/FT670)



CONNECTIONS AND CONTROLS

Front Panel (FT650)

1	Mains switch	SU01
2	Frequency/preset switch	SS05
3	Function switch	SS01~SS04
4	Memory switch	SS06
5	FM stereo indicator	DS01
6	Auto stereo indicator	DS02
7	Digital frequency display	VS01
8	Preset station up/down switch	SS07, SS08
9	Tuning up/down switch	SS09, SS10

Rear Panel (FT650, FT670)

A	Antenna input	J101
B	Output	J302
C	Mains cord	W001

Front Panel (FT670)

1	Mains switch	SU01
2	Function switch	ST01~ST04
3	Memory switch	ST05
4	Digital frequency display	VT01
5	Preset station switch	ST06~ST08 ST10~ST12 ST14~ST17
6	Frequency direct access switch	ST09
7	·/·· (1, 2 digit) switch	ST13
8	Tuning up/down switch	ST18, ST19

(GB) Service Routine

1. Tracking Point Memory Mode

1-1. With the power OFF, set the POWER switch to ON while holding the TUNING UP/DOWN keys depressed simultaneously. Q505 Pin 39 changes from "L" to "H" and the tracking point memory is recalled. The Tracking Point Memory mode is provided with the preset memory of several frequencies required in adjustments, and any of them can be recalled for each adjustment.

FT650: The desired frequency can be selected with the PRESET UP/DOWN keys.

FT670: The desired frequency can be recalled by pressing the numeric key of its preset number.

Band \ Pre Set Nbr.	1	2	3	4	5	6
FM [MHz]	90.0	98.0	106.0	–	–	–
AM [KHz]	–	–	–	603	999	1404

7	8	9	10	11	12~30
–	–	–	–	–	Lowest Freq.
173	209	272	152	531	–

1-2. Only during AM reception in the Tracking Point Memory mode, the digital display on the rightmost part of the display panel lights when Q505 pin 5 goes "L". This makes it possible to adjust the AM auto stop function.

* The Tracking Point Memory mode can be canceled by setting the POWER switch to OFF.

2. Segment Check Mode

– When the TUNING UP/DOWN k.
taneously in the Tracking Point M.. ..e
muting signal is output so the Segment .. ..node
program starts. The muting is kept ON during the execution of the program. In the Segment Check mode, all of the display segments are turned off once, then each of them lights sequentially from (1) in the order shown below. Unused segments are not turned ON, and the lighted segments remains ON while the additional segments light in sequence.

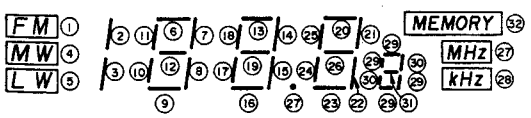
– When all segments have lit, the Segment Check mode program terminates and the band and frequency returns to the previous contents to the start of the Segment Check mode.

– When the MEMORY key is pressed during segment check, all segments light and keeps that lighted condition. If the MEMORY key is pressed again, the Segment Check program terminates at that time.

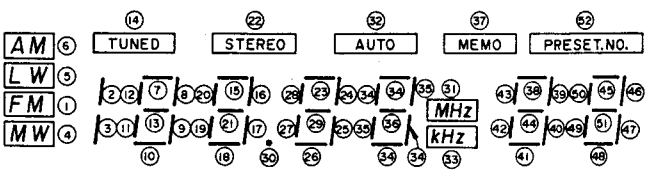
– During execution of the Segment Check mode, no keys and switches are accepted except for the MEMORY key and POWER switch.

– The Segment Check mode is canceled is canceled by setting the POWER switch to OFF.

FT650



FT670



(F) Programme de service

1. Mode de mémoire du point d'analyse

1-1. L'appareil étant hors tension, régler l'interrupteur POWER our ON tout on maintenant simultanément les touohes TUNING UP/DOWN enfoncées. La broche 39 de Q505 change de "L" à "H" est la mémoire du point d'analyse est rappelée. Le mode de mémoire du point d'analyse est doté d'une mémoire où sont préréglées plusiers fréquenoes, nécessaires lors des ajustements; l'une d'elles peut être rappelée pour chaque réglage.
FT650: La fréquence souhaitée peut être choisie par les touches PRESET UP/DOWN.
FT670: La fréquence souhaitée peut être rappelée par poussée sur la touche numérique de son préréglage.

No de préréglage / Gamme	1	2	3	4	5	6
FM [MHz]	90,0	98,0	106,0	–	–	–
AM [KHz]	–	–	–	603	999	1404

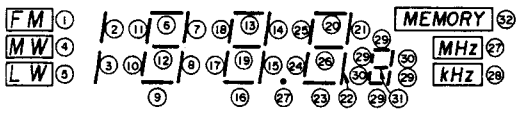
7	8	9	10	11	12~30
–	–	–	–	–	Fréq. la + basse
173	209	272	152	531	–

1-2. Pendant la réception AM en mode de mémoire du point d'analyse, l'indication numérique à l'extrême droite du panneau d'affichage s'allume quand la broche 5 de Q505 passe à "L", ce qui permet d'ajuster la fonction d'arrêt automatique AM.
Le mode de mémoire du point d'analyse peut être annulé en ramenant l'interrupteur POWER sur OFF.

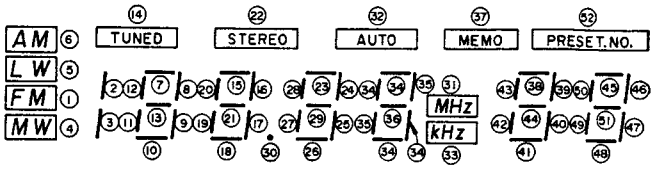
2. Mode de vérification des segments

- Quand les touches TUNING UP/DOWN sont actionnées simultanément en mode de mémoire du point d'analyse, le signal de sourdine est obtenu et le programme du mode de vérification des segments est lancé. La sourdine reste en service pendant l'exécution du programme. En mode de vérification des segments, tous les segments de l'affichage sont éteints en une fois, puis chacun d'eux s'allume à partir de (1) dans l'ordre indiqué ci-après. Les segments inutilisés ne s'allument pas, tandis que les segments allumés restent allumés pendant que les suivants s'allument à leur tour.
- Quand tous les segments se sont allumés, le programme du mode de vérification des segments s'achève tandis que la gamme et la fréquence reviennent au contenu antérieur.
- Quand la touche MEMORY est actionnée pendant la vérification des segments, tous les segments s'allument et restent allumés. Si la touche MEMORY est à nouveau actionnée, le programme s'achève à ce point.
- Pendant l'exécution du mode de vérification des segments, aucune touche ou interrupteur n'est utilisable à l'exception de la touche MEMORY et de l'interrupteur POWER.
- Ramener l'interrupteur POWER sur OFF pour annuler le mode de vérification des segments.

FT650



FT670



(NL) Service-routine

1. Spoorpunt-geheugenstand

1-1. Vanuit de uitgeschakelde toestand van het apparaat de POWER schakelaar op ON zetten en tegelijkertijd de TUNING UP/DOWN toetsen ingedrukt houden. Q505 pen 39 verandert van "L" naar "H" en het spoorpunt-geheugen wordt opgeroepen. De spoorpunt-geheugenstand komt samen met het voorkeuzegeheugen van de diverse frequenties die voor de afstellingen vereist zijn en elke frequentie kan voor afstelling worden opgeroepen.

FT650: De gewenste frequentie kan gekozen worden met de PRESET UP/DOWN toetsen.

FT670: De gewenste frequentie kan opgeroepen worden door de cijfertoets van het bijbehorende voorkeuzenummer in te drukken.

Golfband \ Voorkeuzenummer	1	2	3	4	5	6
FM [MHz]	90,0	98,0	106,0	–	–	–
AM [KHz]	–	–	–	603	999	1404

7	8	9	10	11	12~30
–	–	–	–	–	Laagste freq.
173	209	272	152	531	–

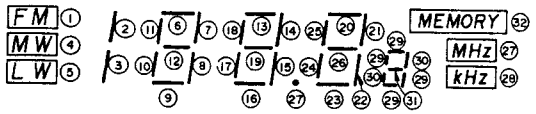
1-2. Alleen bij AM-ontvangst in de spoorpunt-geheugenstand zal de digitale display geheel rechts op de display oplichten als Q505 pen 5 "L" wordt. Dit maakt afstelling van de AM automatische stopfunctie mogelijk.

* De spoorpunt-geheugenstand kan geannuleerd worden door de POWER schakelaar op OFF te zetten.

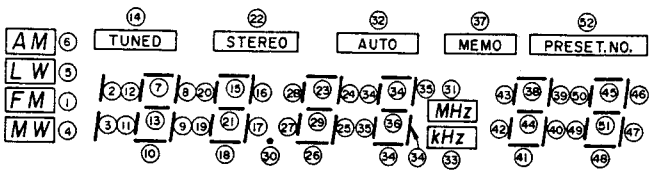
2. Segment-controlestand

- Als in de spoorpunt-geheugenstand de TUNING UP/DOWN toetsen gelijktijdig worden ingedrukt, zal het dempingssignaal worden uitgestuurd waardoor het programma van de segment-controlestand in werking treedt. De dempingsfunctie blijft tijdens het uitvoeren van het programma ingeschakeld. In de segment-controlestand gaan alle segmentjes van de display eenmaal uit, waarna vanaf (1) elk segmentje in de hieronder aangegeven volgorde oplicht. De niet gebruikte segmentjes lichten niet op en de segmentjes die oplichten blijven branden terwijl de andere segmentjes oplichten.
- Zodra alle segmentjes oplichten, is het programma afgelopen en worden de golfband en frequentie die voorheen aanwezig waren weer opgeroepen.
- Als tijdens het controleren van de segmentjes op de MEMORY toets wordt gedrukt, zullen alle segmentjes oplichten en blijven deze branden. Wordt nogmaals op de MEMORY toets gedrukt, dan wordt het segment-controleprogramma beëindigd.
- Tijdens het uitvoeren van het segment-controleprogramma werkt geen van de toetsen en schakelaars, met uitzondering van de MEMORY toets en POWER schakelaar.
- De segment-controlestand komt te vervallen als de POWER schakelaar op ON wordt gezet.

FT650



FT670



(D) Wartungsverfahren

1. Spurhaltepunktspeicher-Modus

1-1. Bei ausgeschalteter Spannungsversorgung die TUNING UP/DOWN-Tasten gleichzeitig gedrückt halten und den POWER-Schalter auf ON stellen. Q505 Stift 39 wechselt von "L" zu "H", und der Spurhaltepunktspeicher wird abgerufen. Der Spurhaltepunktspeicher-Modus verfügt über mehrere voreingestellte Frequenzen, die für die Einstellungen benötigt werden, von denen jede für die einzelnen Einstellungen abgerufen werden können.

FT650: Die gewünschte Frequenz kann mit den PRESET UP/DOWN-Tasten gewählt werden.

FT670: Die gewünschte Frequenz kann durch Drücken der Zahlentaste ihrer Speichernummer abgerufen werden.

Speicher-Nr. / Wellenbereich	1	2	3	4	5	6
UKW [MHz]	90,0	98,0	106,0	–	–	–
MW [KHz]	–	–	–	603	999	1404

7	8	9	10	11	12~30
–	–	–	–	–	niedrigste Frequenz
173	209	272	152	531	–

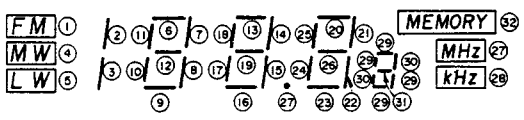
1-2. Nur bei MW-Empfang im Spurhaltepunktspeicher-Modus leuchtet die Digitalanzeige des ganz rechten Teils des Displays, wenn Q505 Stift 5 zu "L" wechselt. Dadurch ist es möglich, die MW-Autostop-Funktion einzustellen.

* Der Spurhaltepunktspeicher-Modus kann verlassen werden, indem der POWER-Schalter auf OFF gestellt wird.

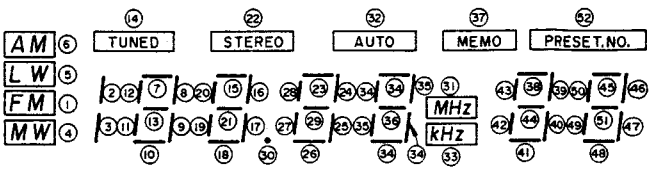
2. Segmentprüfungs-Modus

- Wenn die TUNING UP/DOWN-Tasten gleichzeitig im Spurhaltepunktspeicher-Modus gedrückt werden, wird das Dämpfungssignal ausgegeben, so daß das Segmentprüfungs-Modus-Programm startet. Die Dämpfung bleibt während der Ausführung des Programms eingeschaltet. Im Segmentprüfungs-Modus werden alle Displaysegmente einmal ausgeschaltet, dann leuchtet jedes davon nacheinander, beginnend mit (1), in der unten dargestellten Reihenfolge. Nicht benutzte Segmente werden nicht aktiviert, und die leuchtenden Segmente bleiben aktiviert, während die zusätzlichen Segmente der Reihe nach leuchten.
- Wenn alle Segmente geleuchtet haben, endet das Segmentprüfungs-Modus-Programm, und Wellenbereich und Frequenz werden zurück auf den Zustand zu Beginn des Segmentprüfungs-Modus geschaltet.
- Wenn die MEMORY-Taste während der Segmentprüfung gedrückt wird, leuchten alle Segmente und bleiben in diesem leuchtenden Zustand. Wird die MEMORY-Taste erneut gedrückt, wird das Segmentprüfungs-Programm abgebrochen.
- Während der Ausführung des Segmentprüfungs-Modus werden keine Tasten- und Schalterbetätigungen mit Ausnahme der MEMORY-Taste und des POWER-Schalters angenommen.
- Der Segmentprüfungs-Modus wird verlassen, indem der POWER-Schalter auf OFF gestellt wird.

FT650



FT670



(I) Procedura di servizio

1. Modo di memoria del punto di allineamento

1-1. Con l'alimentazione OFF, portare l'interruttore POWER su ON tenendo premuti i tasti TUNING UP/DOWN contemporaneamente. Il piedino 39 di Q505 cambia da "L" ad "H" e la memoria del punto di allineamento viene richiamata. Il modo di memoria del punto di allineamento viene fornito con la memoria preimpostata di diverse frequenze necessarie nelle regolazioni e ciascuna di esse può essere richiamata per ciascuna regolazione.

FT650: La frequenza desiderata può essere selezionata per mezzo dei tasti PRESET UP/DOWN.

FT670: La frequenza desiderata può essere selezionata premendo il tasto numerico del suo numero di preimpostazione.

No. pre-impostato / Banda	1	2	3	4	5	6
FM [MHz]	90,0	98,0	106,0	–	–	–
AM [KHz]	–	–	–	603	999	1404

7	8	9	10	11	12~30
–	–	–	–	–	Frequenza più bassa
173	209	272	152	531	–

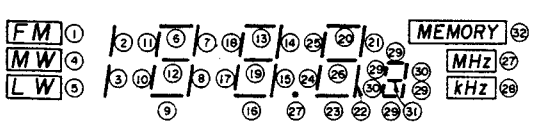
1-2. Solo durante la ricezione AM nel modo di memoria del punto di allineamento il display numerico all'estrema destra del display si illumina quando il piedino 5 di Q505 diviene "L". Ciò rende possibile regolare la funzione AM di stop automatico.

* Il modo di memoria del punto di allineamento può essere cancellato portando l'interruttore POWER su OFF.

2. Modo di controllo dei segmenti

- Quando i tasti TUNING UP/DOWN vengono premuti contemporaneamente nel modo di memoria del punto di allineamento, il segnale di silenziamento viene emesso in modo che il programma di controllo dei segmenti si avvia. Il silenziamento viene mantenuto ON durante l'esecuzione del programma. Nel modo di controllo dei segmenti tutti i segmenti del display vengono spenti e quindi ciascuno di essi si illumina in sequenza da (1) nell'ordine indicato in basso. I segmenti non utilizzati non vengono attivati ed i segmenti illuminati rimangono accesi mentre i segmenti addizionali si illuminano in sequenza.
- Quando tutti i segmenti si sono illuminati, il programma del modo di controllo dei segmenti termina e la banda e la frequenza ritornano sui contenuti precedenti l'inizio del modo di controllo dei segmenti.
- Quando il tasto MEMORY viene premuto durante il controllo dei segmenti, tutti i segmenti si illuminano e rimangono illuminati. Se il tasto MEMORY viene premuto di nuovo, il programma di controllo dei segmenti termina in quel punto.
- Durante l'esecuzione del modo di controllo dei segmenti non vengono accettati tasti o interruttori a parte MEMORY e POWER.
- Il modo di controllo dei segmenti viene cancellato portando l'innterruttore POWER su OFF.

FT650



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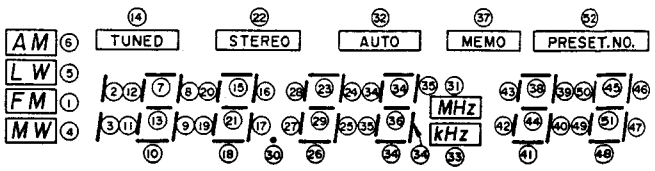
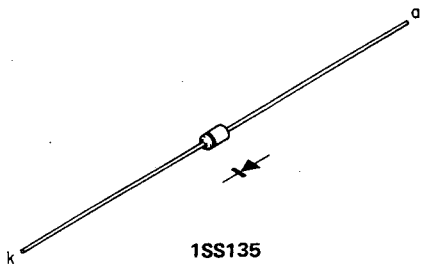
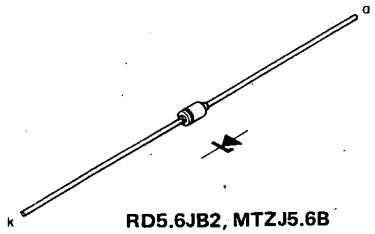


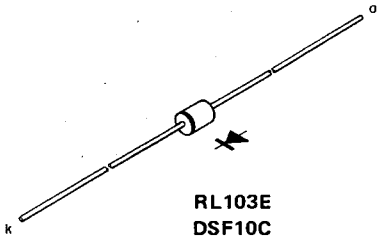
Semiconductor Layout



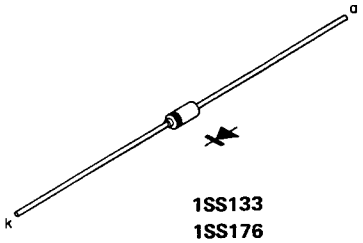
1SS135



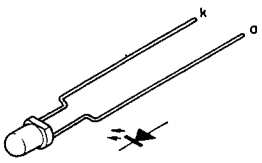
RD5.6JB2, MTZJ5.6B
RD22JB2, MTZJ22D



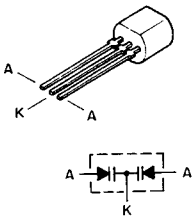
RL103E
DSF10C



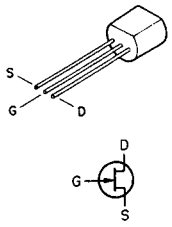
1SS133
1SS176
MA165
1SS254



LT3D8B



SVC342



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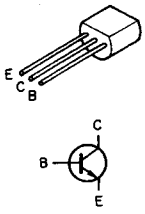

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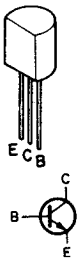
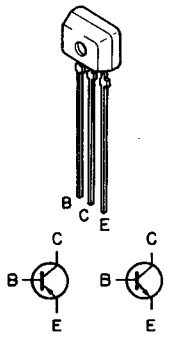
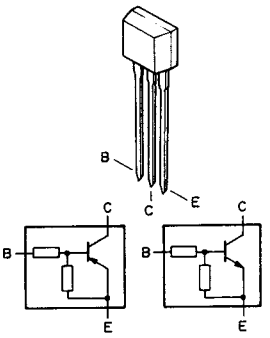


2SD1302



2SA1309A
2SC536SP
2SC1740S
2SC2458
2SC3311A



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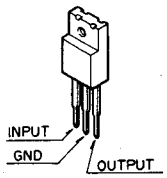
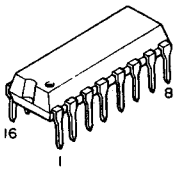
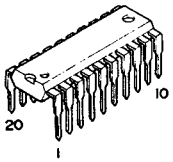


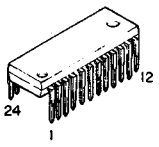
NJM7812A



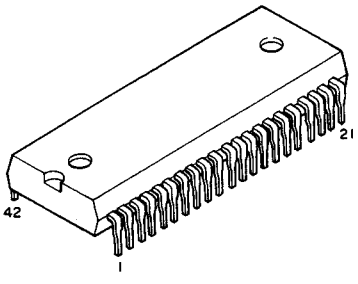
TEA5581



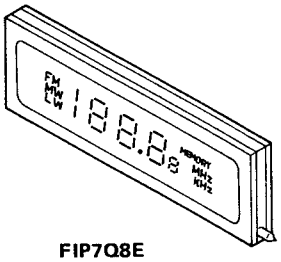
LM7000N



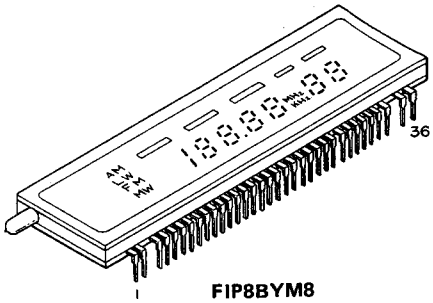
LA1266



LC6514B-4052

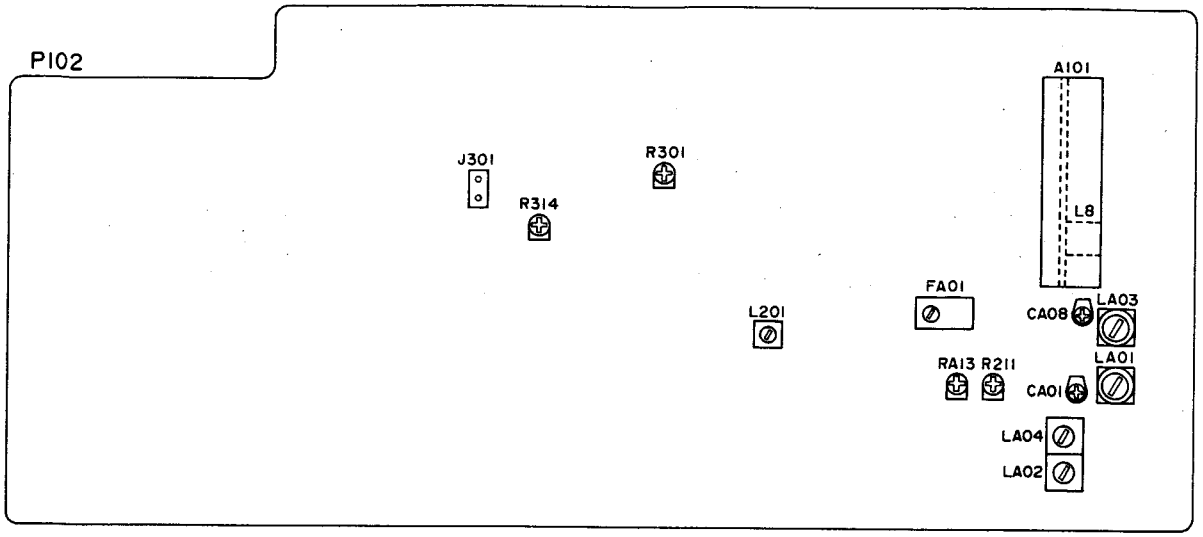


FIP7Q8E



FIP8BYM8

ADJUSTMENT LOCATION



Carbon film 0.125 W or 0.2 W	70°C	5%	
Carbon film 0.25 W or 0.33 W	70°C	5%	
Metal film 0.25 W or 0.33 W	70°C	5%	
Carbon film 0.5 W	70°C	5%	
Carbon film 0.67 W	70°C	5%	
Carbon film 1 W or 1.15 W	70°C	5%	

Ⓒ Chip component

Ceramic plate Tuning ⩽ 120 pF NP.0		2%
Ceramic plate Others		−20/+80%
Polyester flat foil		10%
Metalized polyester flat film		10%
Polyester flat foil small size (Mylar)		10%
Polysterene film/foil		1%
Tubular ceramic		
Miniature single		
Subminiature tantalum		± 20%

*a = 2.5 V
b = 3.15 V or 4 V
c = 6.3 V
d = 10 V
e = 16 V
f = 25 V
g = 40 V
h = 63 V
j = 100 V
l = 125 V
m = 150 V
n = 160 V
q = 200 V
r = 250 V
s = 300 V
t = 350 V
u = 400 V
v = 500 V
w = 630 V
x = 1000 V
A = 1.6 V
B = 6 V
C = 12 V
D = 15 V
E = 20 V
F = 35 V
G = 50 V
H = 75 V
I = 80 V

ADJUSTMENTS

- Inner adjustment of the FM front end pack (A101) of this unit is difficult. (IF, RF, OSC)
- Inductances of the MW OSC coil (LA02) and LW OSC coil (LA04) are preset. Therefore, please do not turn the cores of these coils.
- Different Pos. Nbr's are available for Models FT650 and FT670 regarding the switches listed in the column of "WAVE RANGE SWITCH".
  SS... : FT650
  (ST...) : FT670

FM-Distortion

SK... WAVE RANGE SWITCH	SIGNAL	TO	DISPLAY TUNE IN	DETUNE	ADJUST	OSCILLOSCOPE	INDICATOR
FM SS01 (ST01)	98 MHz Mod. 1 kHz Δf 40 kHz (Mono) Output 500 μV	J101			L201		J302 Distortion Min.
	98 MHz Mod. 1 kHz Δf L+R 40 kHz Pilot 6 kHz Output 500 μV				A101-L8 (Front end IFT)		

MPX VCO

FM SS01 (ST01)	98 MHz Mod. off Output 500 μV	J101			R314		J301 228 kHz

Stereo Separation

FM SS01 (ST01)	98 MHz Mod. 1 kHz Δf L+R 40 kHz Pilot 6 kHz Output 500 μV	J101			R301		J302 Separation Max.

Muting Level

FM SS01 (ST01) FM mode switch SS02 (ST02) (Auto stereo indicator ON)	98 MHz Mod. 1 kHz Δf 40 kHz Output 6.3 μV	J101			R211		J302 [1]

AM-IF

MW SS03 (ST03)	999 kHz Mod. 400 Hz 30% Low Output	Z003			FA01		J302 Output Max.

AM-RF

MW SS03 (ST03)	603 kHz	Z003			LA01		J302 Output Max.
	1404 kHz				CA01		
LW SS04 (ST04)	173 kHz	Z003			LA03		J302 Output Max.
	272 kHz				CA08		

AM Auto Stop

MW SS03 (ST03)	999 kHz Mod. 400 Hz 30% Output 500 μV/m	Z003			RA13		J302 [2]

(GB) Notes:

[1] By turning R211, clear once the output waveform the J302, and then adjust it by turning R211 a little so that the waveform appears again.

[2] Adjust RA13 to the position where the digit display on the rightmost position of the display just starts to light. This adjustment must be performed in Service Routing item 1 "Tracking Point Memory mode".
With the FT670, the TUNED indicator on the display lights at the same time as the digit display on the rightmost position of the display lights.

(F) Remarques:

[1] En tournant R211, effacer la forme d'onde de sortie de J302 dans un premier temps, puis ajuster celle-ci en tournant doucement R211 de sorte que la forme d'onde apparaisse à nouveau.

[2] Ajuster RA13 de manière que l'indication numérique à l'extrême droite de l'affichage commence juste à s'allumer.
Cet ajustement doit être effectué à l'article 1, "Mode de mémoire du point d'analyse" du programme de service.
Sur le FT670, le témoin TUNED s'allume sur l'affichage s'allume au même moment que s'allume l'indicateur numérique à l'extrême dreite de l'affichage.

(NL) Opmerkingen:

[1] Draai R211 rond om de uitgangsgolfvorm van de J302 eenmaal te doorlopen en stel daarna af door R211 een weinig te draaien zodat de golfvorm weer verschijnt.

[2] Stel RA13 zo af dat de digitale display geheel rechts op de display net begint op te lichten.
Deze afstelling moet in punt 1 "Apoorpunt-geheugenstand" van de service-routine worden uitgevoerd.
Bij de FT670 zal de TUNED indicator op de display op hetzelfde moment oplichten als de digitale display geheel rechts op de display.

(D) Anmerkungen:

[1] Die Ausgangswellenform von J302 durch Drehen von R211 löschen und dann durch geringfügiges Drehen von R211 so einstellen, daß die Wellenform wieder erscheint.

[2] RA13 auf die Position einstellen, an der die Ziffernanzeige auf dem ganz rechten Teil des Displays gerade zu leuchten beginnt.
Diese Einstellung muß in Schritt 1 "Spurhaltepunktspeicher-Modus" des Wartungsverfahrens durchgeführt werden.
Beim FT670 leuchtet die TUNED-Anzeige auf dem Display zur gleichen Zeit, zu der die Ziffernanzeige auf dem ganz rechten Teil des Displays leuchtet.

(I) Note:

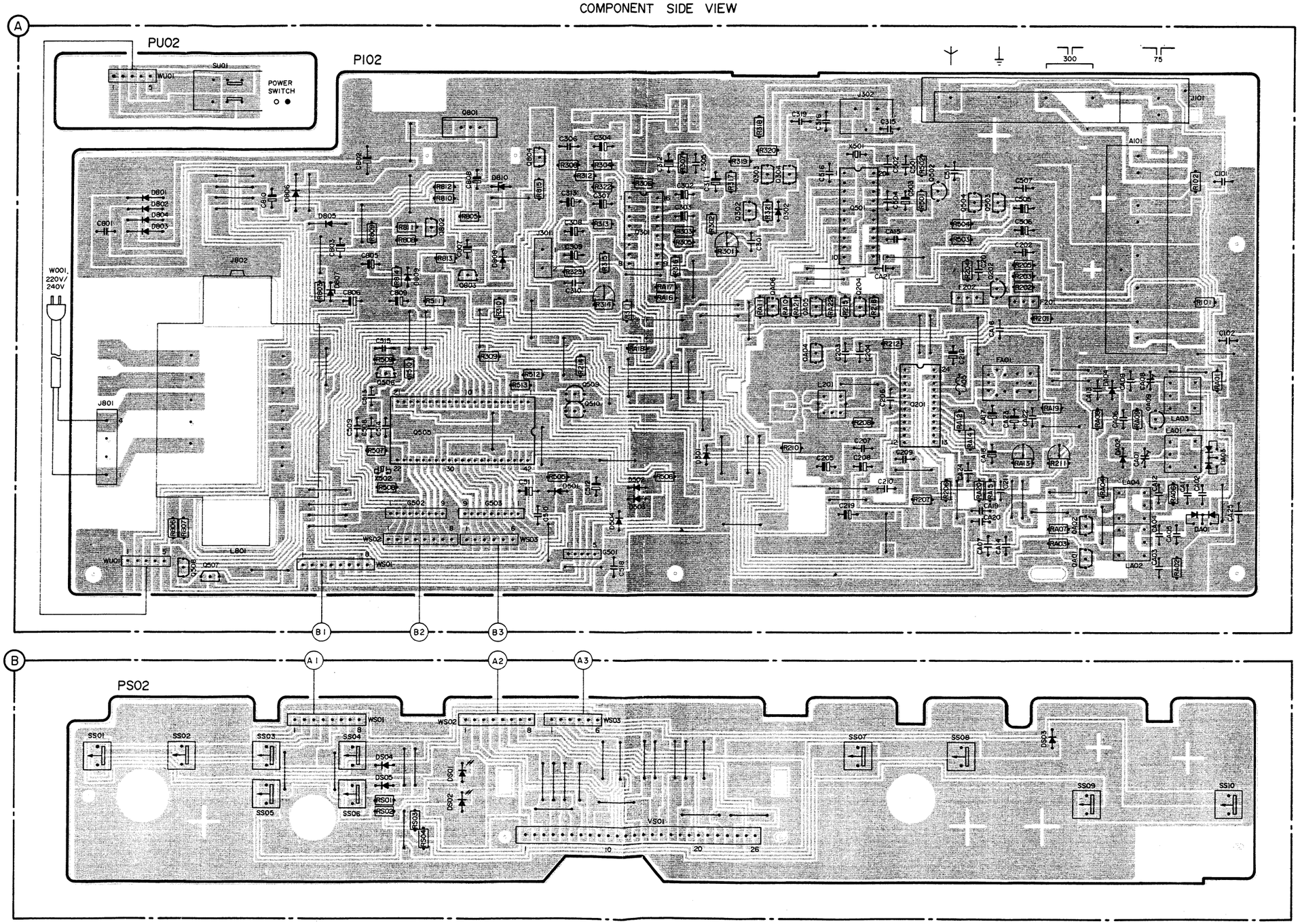
[1] Ruotando R211 cancellare la forma d'onda in uscita di J302 e quindi regolarla ruotando leggermente R211 in modo che la forma d'onda ricompaia.

[2] Regolare RA13 sulla posizione in cui il display numerico all'estrema destra del display comincia appena ad illuminarsi.
Questa regolazione deve essere eseguita nel punto 1 della procedura di manutenzione "Modo di memoria del punto di allineamento".
Con l'FT670, l'indicatore TUNED sul display si illumina assieme al display numerico all'estrema destra del display.

WIRING DIAGRAM(FT650)

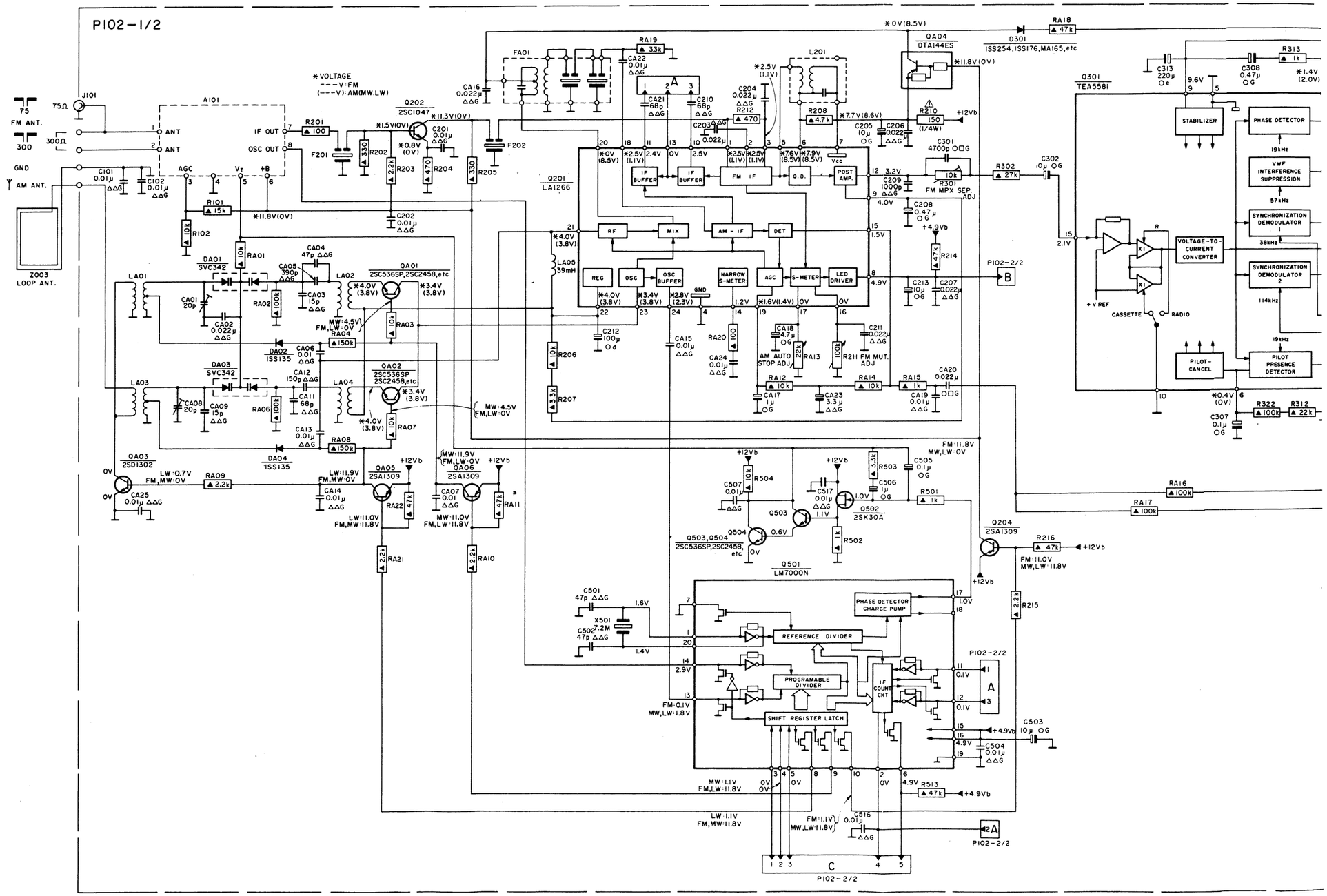
R	R806 R807 R803 R809 R814 R808 R810 ~ R813 R805 R815 R308 R323 R304 R311 ~ R315 R305 ~ R307 R301 ~ R303 R317 ~ R321 R501 ~ R504 R204 R205 R201 ~ R203 RA08 RA09 R102 R101 RA01 R507 ~ R511 R501 ~ RS04 R309 R310 R513 R512 R505 R214 R322 RA16 ~ RA18 R506 R316 RA11 RA10 RA21 R210 RA22 R215 R208 R216 R212 R207 R206 RA12 RA14 RA20 RA15 RA13 RA19 R211 RA07 RA03 RA04 RA06 RA02	R
C	C801 C810 C803 C806 C802 C805 C809 C807 C808 C313 C306 ~ C310 C304 C312 C302 C303 C305 C311 C301 C319 C316 C516 CA21 C315 CA15 C501 ~ C504 C517 C201 CA16 C202 C505 ~ C507 CA13 CA06 CA09 CA01 CA08 CA12 C101 C102 C509 C508 C513 ~ C515 C511 C510 C512 C518 C219 C203 ~ C210 C212 CA24 CA07 CA17 ~ CA20 CA14 C211 CA23 CA22 CA03 ~ CA05 CA11 CA02 CA25	C
Q	Q802 Q801 Q803 Q804 Q301 Q302 ~ Q304 Q501 Q502 Q504 Q503 Q202 Q508 Q507 Q506 Q505 Q509 Q510 QA06 QA05 QA04 Q204 Q201 QA01 QA02 QA09	Q
D	D801 ~ D804 D806 D805 D807 DS04 DS05 D809 DS01 DS02 D810 D808 D501 D504 D502 D503 D301 D302 DS03 DA04 DA02 DA01 DA03	D
F-G-L-S-V-X	SS01 SS02 SU01 L801 SS03 SS05 SS04 SS06 X502 G502 G503 G501 VS01 L201 X501 SS07 SS08 LA05 F202 FA01 F201 SS09 LA02 LA04 LA01 LA03 SS10	F-G-L-S-V-X

COMPONENT SIDE VIEW



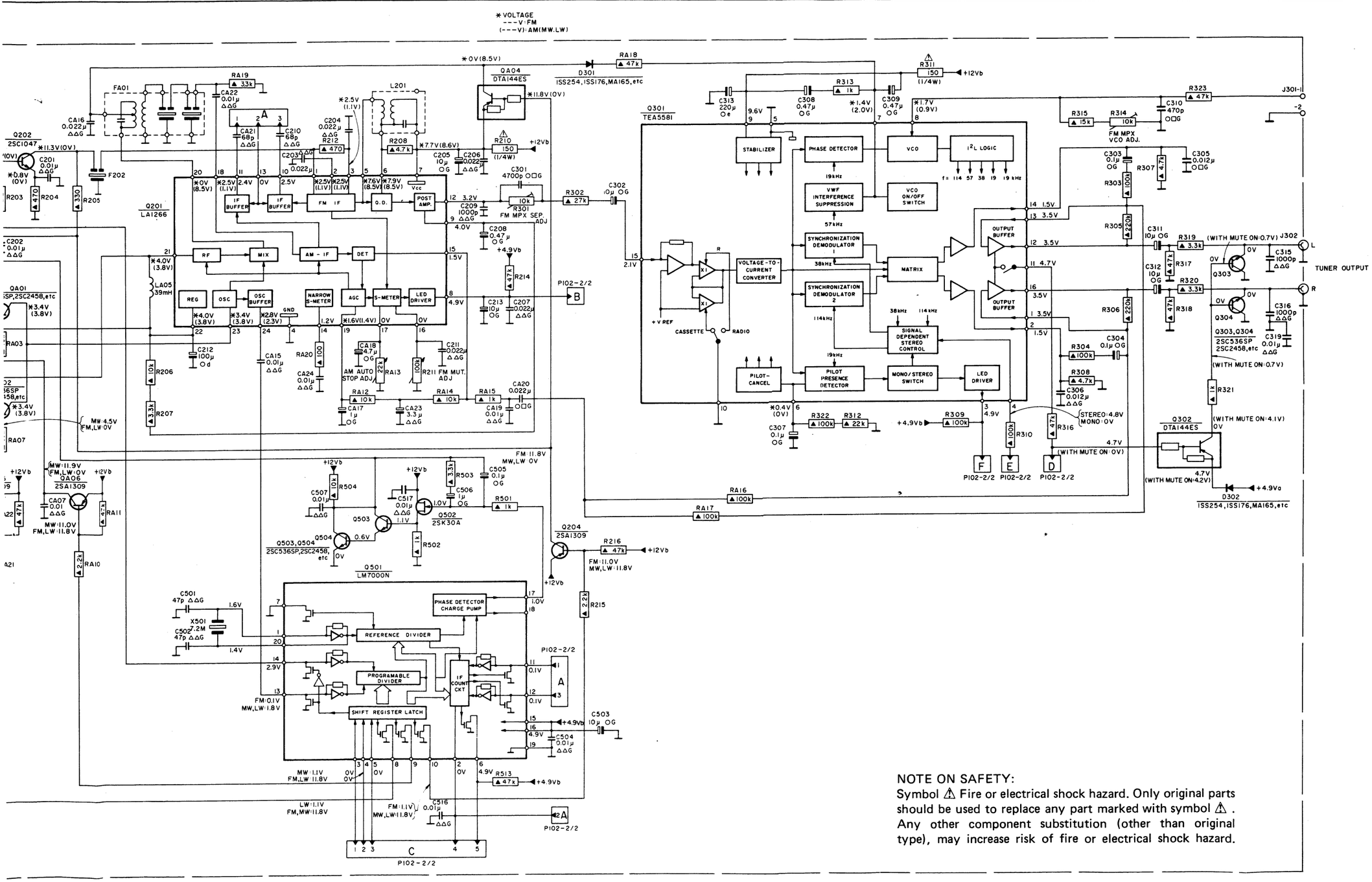
SCHEMATIC DIAGRAM(FT650/FT670)

R	R102 R101 RA01 RA02 R201 RA04 R202 R203 RA03 R204 R205 R206 R207 RA19 RA20 R212 RA13 R208 R211 RA14 RA15 R210 R214 R301 R302 RA18 R313 RA09 RA06 RA08 RA21 RA07 RA22 RA10 RA11 R504 R502 R503 R501 R513 R215 R216 RA17 RA16 R322 R312
C	C101 C102 CA01 CA02 CA03~CA06 C202 C201 CA16 C212 CA22 CA21 CA15 C210 C203 CA24 C204 C211 C205~C209 C213 C301 C302 C313 C308 CA25 CA08 CA09 CA11~CA14 CA07 C501 C502 C507 CA17 CA18 CA23 C517 C516 C506 CA19 CA20 C505 C504 C503 C307
Q	QA03 QA01 QA02 QA05 Q202 QA06 Q201 Q501~Q504 QA04 Q204 Q301
D	DA01~DA04 D301
A-F-L-X-Z	Z003 LA01 LA03 A101 F201 LA02 LA04 F202 FA01 X501 L201



SCHEMATIC DIAGRAM(FT650/FT670)

D3 RA03 R204 R205 R206 R207 RA19 RA20 R212 RA12 RA13 R208 R211 RA14 RA15 R210 R214 R301 R302 RA18 R313 R311 R315 R314 R303 R307 R323	R
RA07 RA22 RA10 RA11 R504 R502 R503 R501 R513 R215 R216 RA17 RA16 R322 R312 R309 R310 R316 R304 R308 R305 R306 R317~R320 R321	
02 C201 CA16 C212 CA22 CA21 CA15 C210 C203 CA24 C204 C211 C205~C209 C213 C301 C302 C313 C308 C309 C303 C311 C310 C305 C315	C
CA07 C501 C502 C507 CA17 CA18 CA23 C517 C516 C506 CA19 CA20 C505 C504 C503 C307 C306 C304 C312 C316 C319	
02 QA05 Q202 QA06 Q201 Q501~Q504 QA04 Q204 Q301 Q302 Q303 Q304	Q
D301 D302	D
F202 FA01 X501 L201	A-F-L-X-Z



NOTE ON SAFETY:
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SCHEMATIC DIAGRAM(FT650/FT670)

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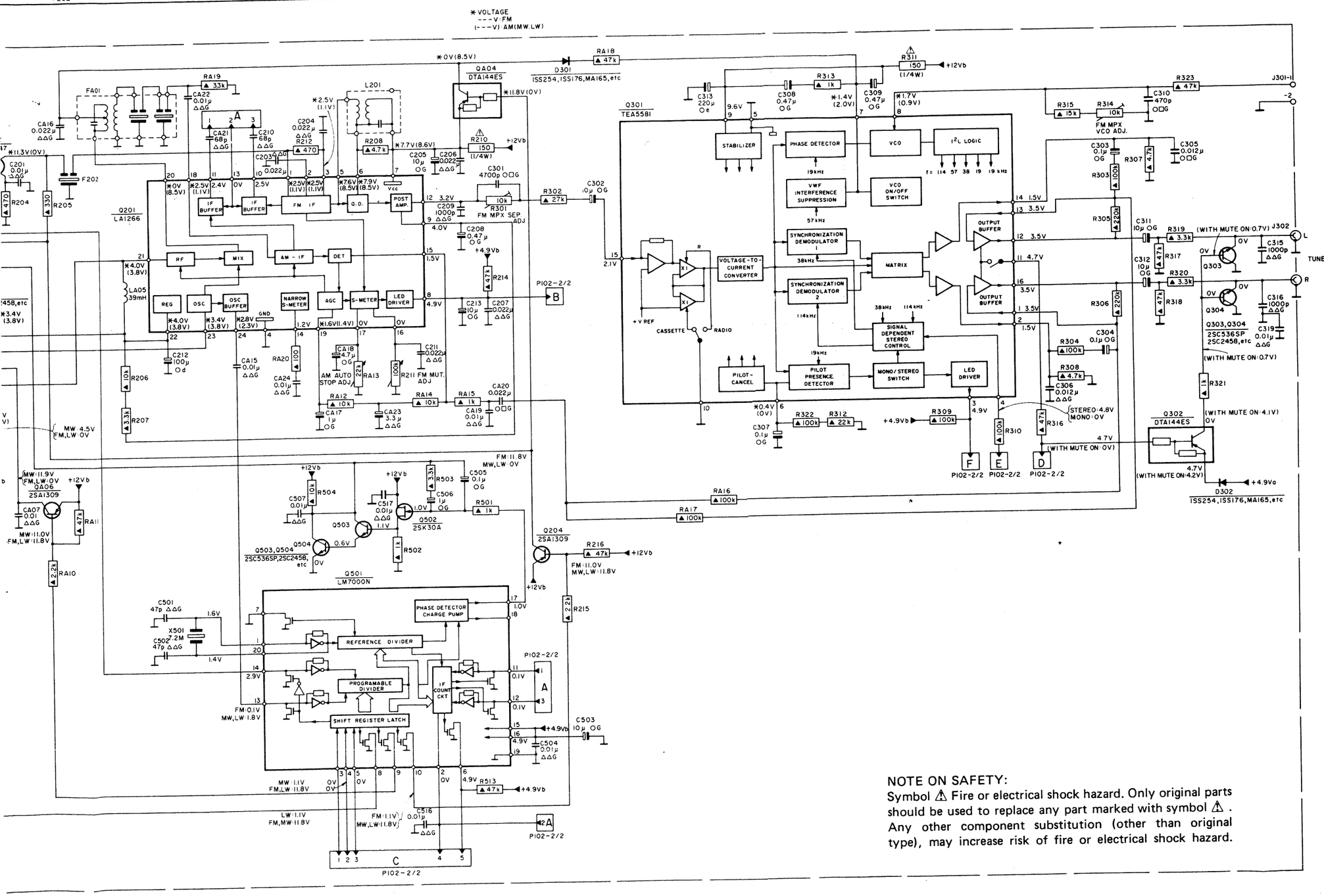
SCHEMATIC DIAGRAM(FT650/FT670)

R204 R205 R206 R207 RA19 RA20 R212 RA12 RA13 R208 R211 RA14 RA15 R210 R214 R301 R302 RA18 R313 R311 R315 R314 R303 R307 R323	R
RA22 RA10 RA11 R504 R502 R503 R501 R513 R215 R216 RA17 RA16 R322 R312 R309 R310 R316 R304 R308 R305 R306 R317~R320 R321	
C201 CA16 C212 CA22 CA21 CA15 C210 C203 CA24 C204 C211 C205~C209 C213 C301 C302 C313 C308 C309 C303 C311 C310 C305 C315	C
CA07 C501 C502 C507 CA17 CA18 CA23 C517 C516 C506 CA19 CA20 C505 C504 C503 C307 C306 C304 C312 C316 C319	
Q202 QA06 Q201 Q501~Q504 QA04 Q204 Q301 Q302 Q303 Q304	Q
D301 D302	D
F202 FA01 X501 L201	A-F-L-X-Z



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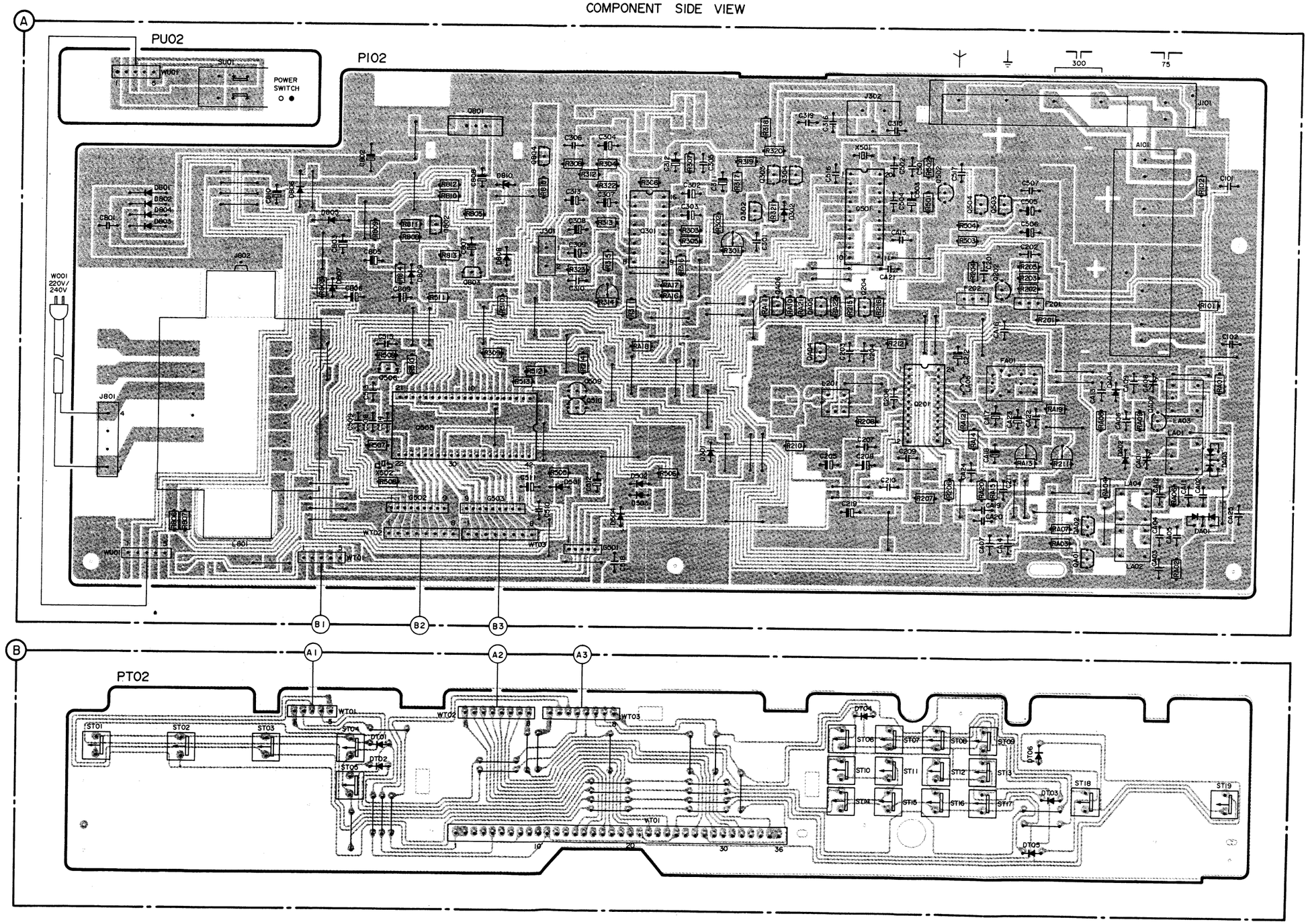
WIRING DIAGRAM(FT670)

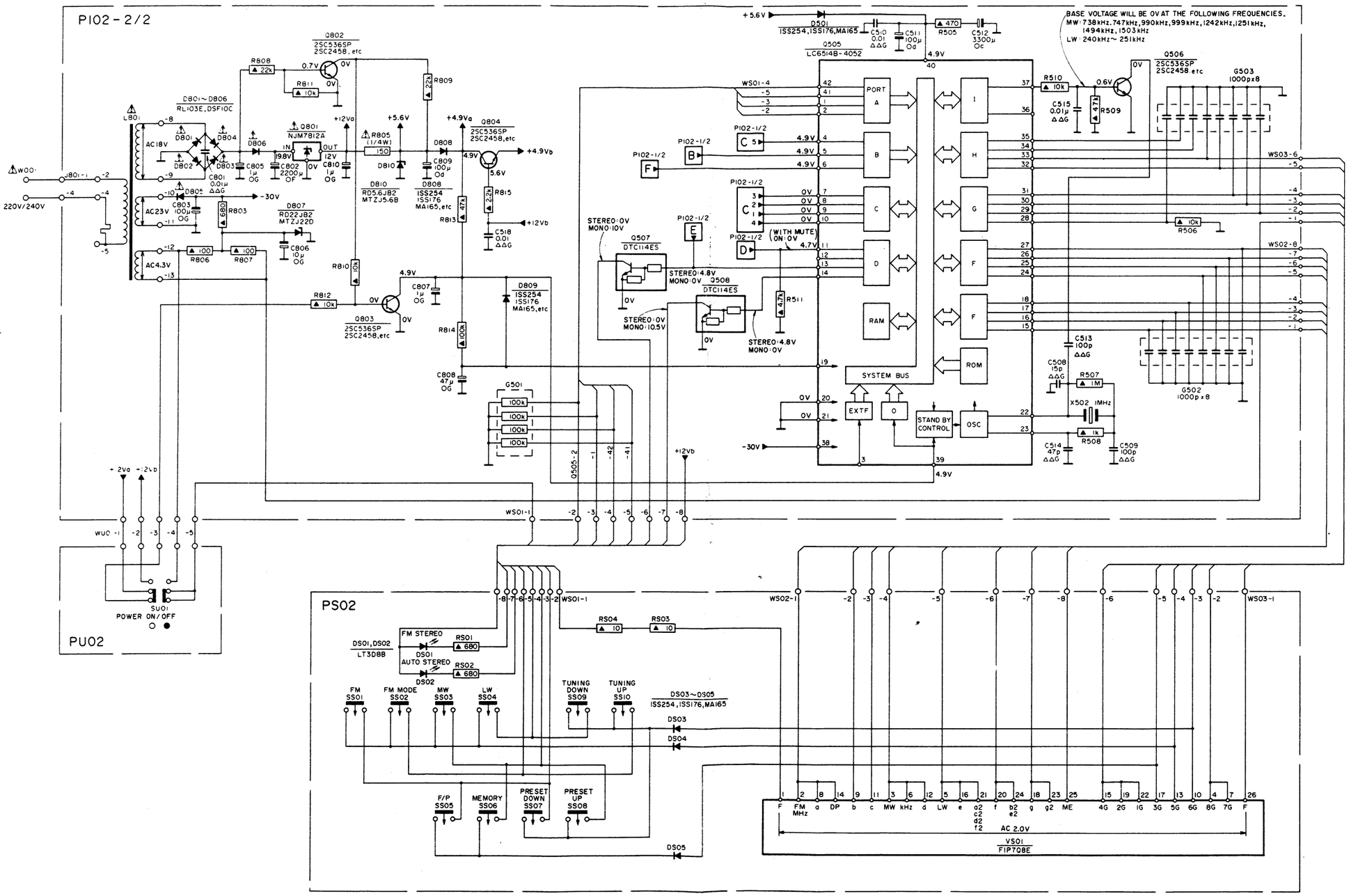
R	R806 R807 R803 R809 R814 R808 R810～R813 R805 R815 R308 R323 R304 R311～R315 R305～R307 R301～R303 R317～R321 R501～R504 R204 R205 R201～R203 RA08 RA09 R102 R101 RA01 R507～R511 R501～R504 R309 R310 R513 R512 R505 R214 R322 RA16～RA18 R506 R316 RA11 RA10 RA21 R210 RA22 R215 R208 R216 R212 R207 R206 RA12 RA14 RA20 RA15 RA13 RA19 R211 RA07 RA03 RA04 RA06 RA02	R
C	C801 C810 C803 C806 C802 C805 C809 C807 C808 C313 C306～C310 C304 C312 C302 C303 C305 C311 C301 C319 C316 C516 CA21 C315 CA15 C501～C504 C517 C201 CA16 C202 C505～C507 CA13 CA06 CA09 CA01 CA08 CA12 C101 C102 C509 C508 C513～C515 C511 C510 C512 C518 C219 C203～C210 C212 CA24 CA07 CA17～CA20 CA14 C211 CA23 CA22 CA03～CA05 CA11 CA02 CA25	C
Q	Q802 Q801 Q803 Q804 Q201 Q302～Q304 Q501 Q502 Q504 Q503 Q202 Q506 Q505 Q509 Q510 QA06 QA05 QA04 Q204 Q201 QA01 QA02 QA09	Q
D	D801～D804 D806 D805 D807 DT01 DT02 D809 D810 D808 D501 D504 D502 D503 D301 D302 DT04 DT05 DT06 DT03 DA04 DA02 DA01 DA03	D
F-G-L-S-V-X	ST01 ST02 SU01 L801 ST03 ST04 ST05 X502 G502 G503 G501 VT01 L201 X501 ST06～ST17 LA05 F202 FA01 F201 ST18 LA02 LA04 LA01 LA03 ST19	F-G-L-S-V-X

COMPONENT SIDE VIEW



SCHEMATIC DIAGRAM(FT650)

R	R806 R803 R807 R808 R811 R812 R810 R805 R809 R813~R815 RS01 RS02 RS04 RS03 R511 R505 R510 R507~R509 R506	R
C	C803 C801 C805 C802 C806 C810 C809 C807 C808 C518 C510 C511 C512 C513~C515 C508 C509	C
Q-D	D805 D801~D804 D806 D807 Q801 Q802 Q803 D810 DS01 DS02 D808 Q804 D809 Q507 DS03~DS05 Q508 D501 Q505 Q506	Q-D
L-S-V-G-X	L801 SU01 SS01 SS02 SS03~SS06 G501 SS07~SS09 SS10 VS01 X502 G502 G503	L-S-V-G-X



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WIRING DIAGRAM(FT650)

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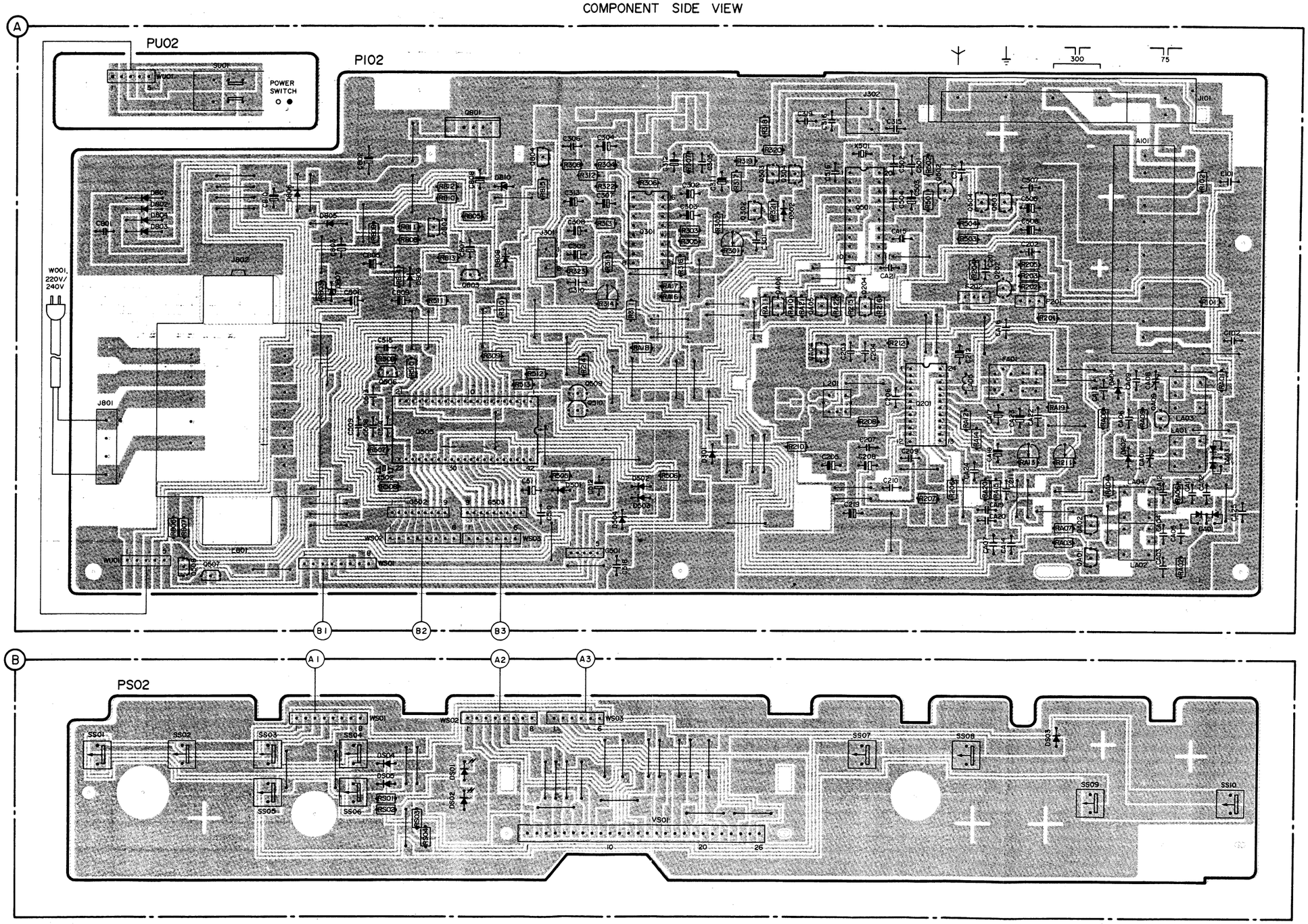
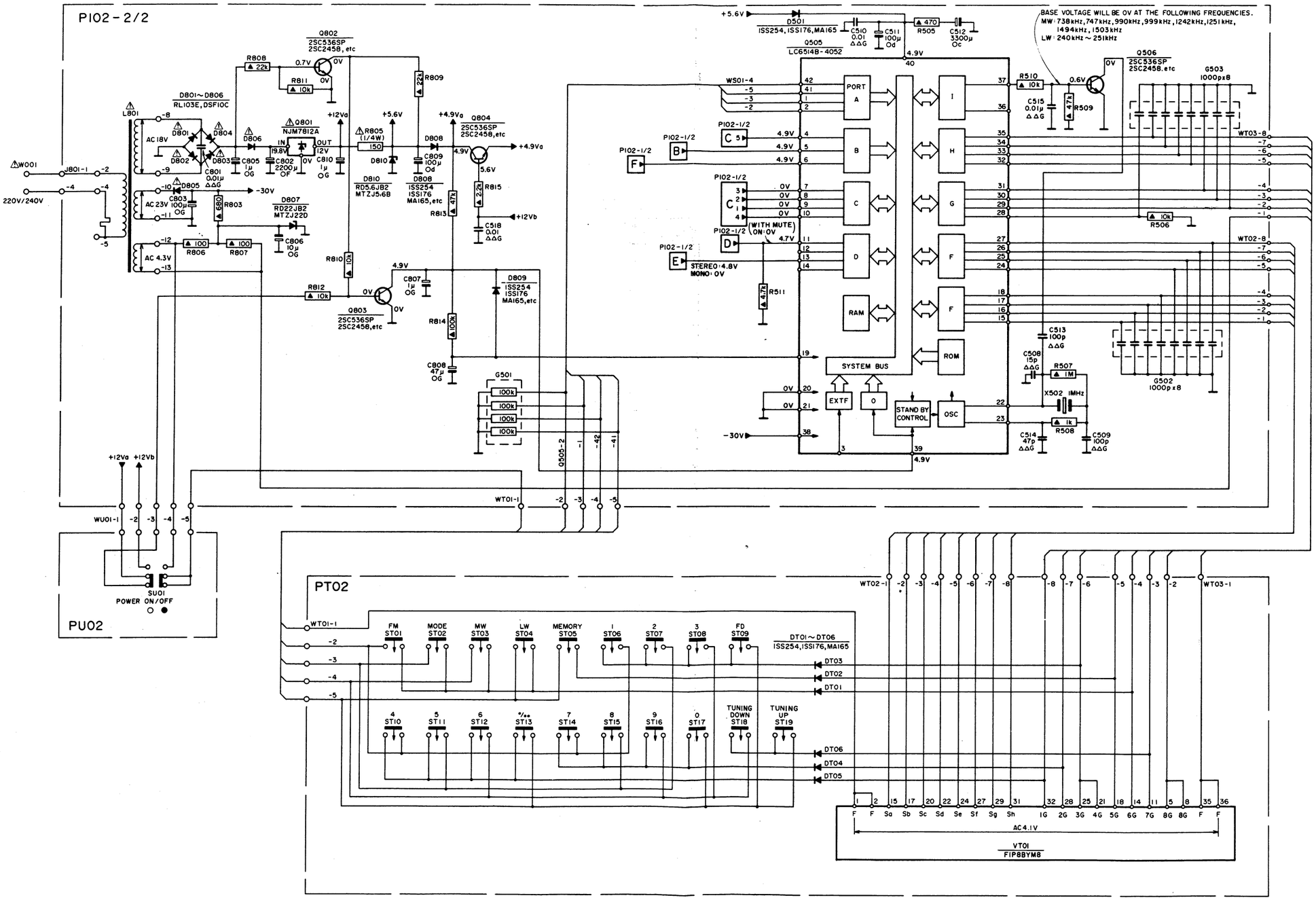
C	C801 C810 C803 C806 C802 C805 C809 C807 C808 C313 C306 ~ C310 C304 C312 C302 C303 C305 C311 C301 C319 C316 C516 CA21 C315 CA15 C501 ~ C504 C517 C201 CA16 C202 C505 ~ C507 CA13 CA06 CA09 CA01 CA08 CA12 C101 C102 C509 C508 C513 ~ C515 C511 C510 C512 C518 C219 C203 ~ C210 C212 CA24 CA07 CA17 ~ CA20 CA14 C211 CA23 CA22 CA03 ~ CA05 CA11 CA02 CA25	C
Q	Q802 Q801 Q803 Q804 Q301 Q302 ~ Q304 Q501 Q502 Q504 Q503 Q202 Q508 Q507 Q506 Q505 Q509 Q510 QA06 QA05 QA04 Q204 Q201 QA01 QA02 QA09	Q
D	D801 ~ D804 D806 D805 D807 DS04 DS05 D809 DS01 DS02 D810 D808 D501 D504 D502 D503 D301 D302 DS03 DA04 DA02 DA01 DA03	D
F-G-L-S-V-X	SS01 SS02 SU01 L801 SS03 SS05 SS04 SS06 X502 G502 G503 G501 VS01 L201 X501 SS07 SS08 LA05 F202 FA01 F201 SS09 LA02 LA04 LA01 LA03 SS10	F-G-L-S-V-X

COMPONENT SIDE VIEW



SCHEMATIC DIAGRAM(FT670)

R	R806 R803 R807 R808 R811 R812 R810 R805 R809 R813 R814 R815 R511 R505 R510 R507～R509 R506	R
C	C803 C801 C805 C802 C806 C810 C809 C807 C808 C518 C510 C511 C512 C513～C515 C508 C509	C
Q-D	D805 D801～D804 D806 D807 Q801 Q802 Q803 D810 D808 Q804 D809 D501 Q505 DT01～DT06 Q506	Q-D
L-S-V-G-X	L801 SU01 ST01～ST03 ST10～ST12 G501 ST04～ST06 ST13～ST15 ST07～ST09 ST16～ST19 VT01 X502 G502 G503	L-S-V-G-X

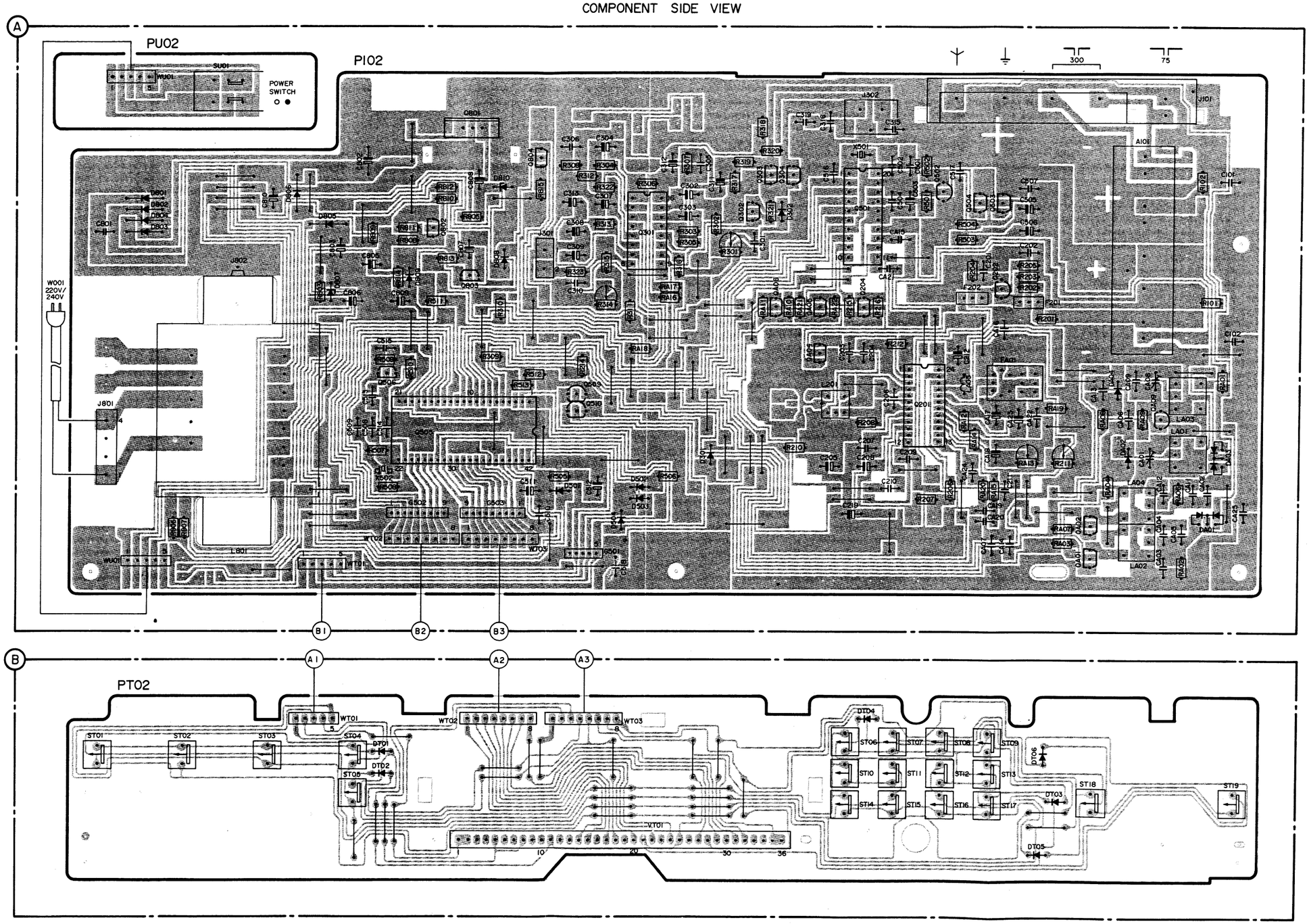


NOTE ON SAFETY:
Symbol ⚠ Fire or electrical shock hazard. Only original parts should be used to replace any part marked with symbol ⚠. Any other component substitution (other than original type), may increase risk of fire or electrical shock hazard.

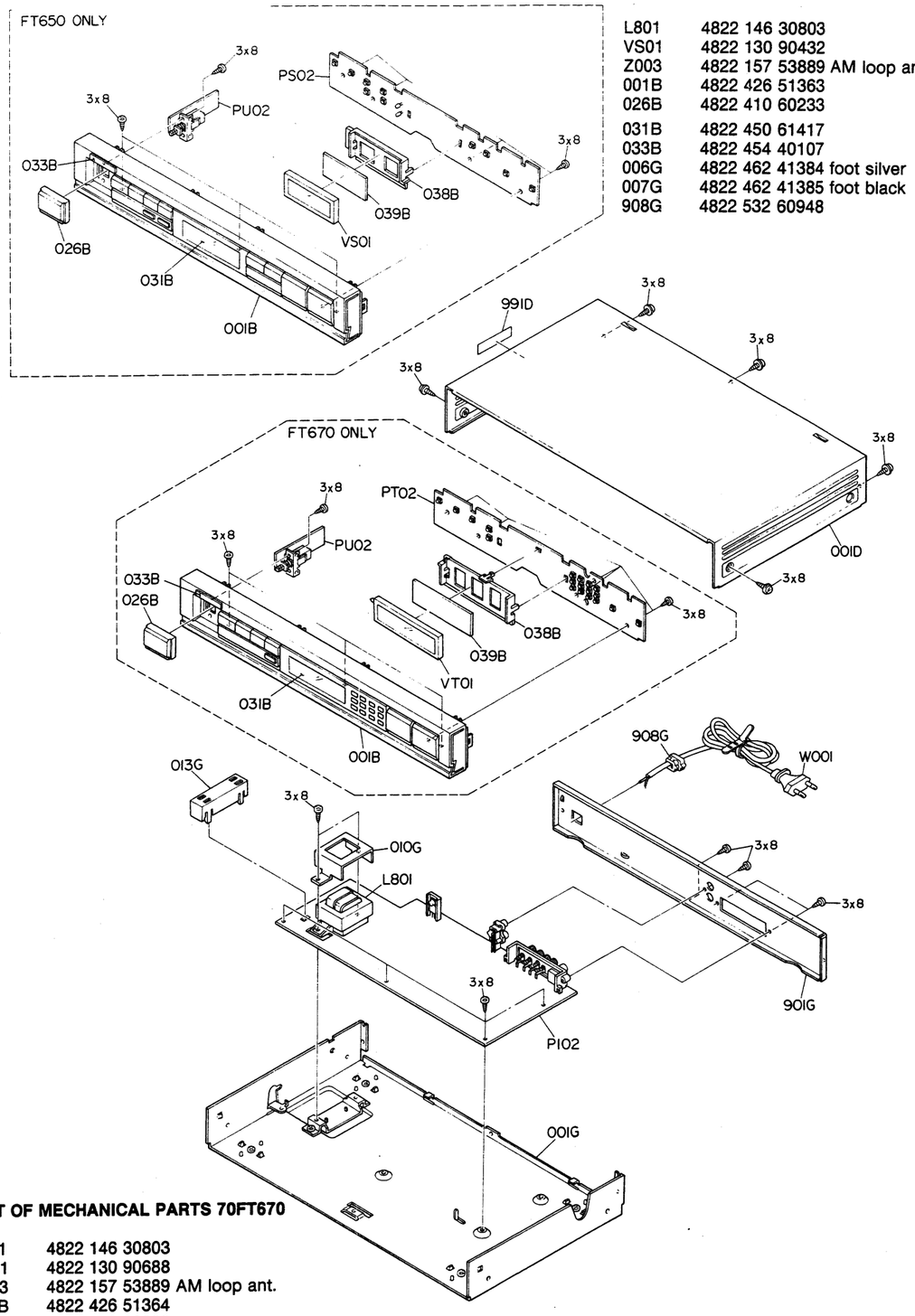
WIRING DIAGRAM(FT670)

R	R806 R807 R803 R809 R814 R808 R810～R813 R805 R815 R308 R323 R304 R311～R315 R305～R307 R301～R303 R317～R321 R501～R504 R204 R205 R201～R203 RA08 RA09 RI02 RI01 RA01 R507～R511 RS01～RS04 R309 R310 R513 R512 R505 R214 R322 RA16～RA18 R506 R316 RA11 RA10 RA21 R210 RA22 R215 R208 R216 R212 R207 R206 RA12 RA14 RA20 RA15 RA13 RA19 R211 RA07 RA03 RA04 RA06 RA02	R
C	C801 C810 C803 C806 C802 C805 C809 C807 C808 C313 C306～C310 C304 C312 C302 C303 C305 C311 C301 C319 C316 C516 CA21 C315 CA15 C501～C504 C517 C201 CA16 C202 C505～C507 CA13 CA06 CA09 CA01 CA08 CA12 C101 C102 C509 C508 C513～C515 C511 C510 C512 C518 C219 C203～C210 C212 CA24 CA07 CA17～CA20 CA14 C211 CA23 CA22 CA03～CA05 CA11 CA02 CA25	C
Q	Q802 Q801 Q803 Q804 Q301 Q302～Q304 Q501 Q502 Q504 Q503 Q202 Q506 Q505 Q509 Q510 QA06 QA05 QA04 Q204 Q201 QA01 QA02 QA09	Q
D	D801～D804 D806 D805 D807 DT01 DT02 D809 D810 D808 D501 D504 D502 D503 D301 D302 DT04 DT05 DT06 DT03 DA04 DA02 DA01 DA03	D
F-G-L-S-V-X	ST01 ST02 SU01 L801 ST03 ST04 ST05 X502 G502 G503 G501 VT01 L201 X501 ST06～ST17 LA05 F202 FA01 F201 ST18 LA02 LA04 LA01 LA03 ST19	F-G-L-S-V-X

COMPONENT SIDE VIEW



EXPLODED VIEW(FT650/FT670)



LIST OF MECHANICAL PARTS 70FT650

L801	4822 146 30803	
VS01	4822 130 90432	
Z003	4822 157 53889	AM loop ant.
001B	4822 426 51363	
026B	4822 410 60233	
031B	4822 450 61417	
033B	4822 454 40107	
006G	4822 462 41384	foot silver
007G	4822 462 41385	foot black
908G	4822 532 60948	

LIST OF MECHANICAL PARTS 70FT670

L801	4822 146 30803	
VT01	4822 130 90688	
Z003	4822 157 53889	AM loop ant.
001B	4822 426 51364	
026B	4822 410 60233	
031B	4822 450 61418	
033B	4822 454 40107	
006G	4822 462 41384	foot silver
007G	4822 462 41385	foot black
908G	4822 532 60948	

Remark:
Only the parts provided with a Service codenumber are available as Service spare parts.

70FT650-70FT670

-MISCELLANEOUS-

A101	4822 210 10372	Tuner FE415-G09	
J101	4822 267 10133	Ant. terminal	
J302	4822 267 30741	Tuner output term.	
J802	4822 290 40209	Earth terminal	
SS01 *	4822 276 12455	Push switch FM	
SS02 *	4822 276 12455	Push switch FM mode	
SS03 *	4822 276 12455	Push switch MW	
SS04 *	4822 276 12455	Push switch LW	
SS05 *	4822 276 12455	Push switch F/P	
SS06 *	4822 276 12455	Push switch memory	
SS07 *	4822 276 12455	Push switch preset down	
SS08 *	4822 276 12455	Push switch preset up	
SS09 *	4822 276 12455	Push switch tuning down	
SS10 *	4822 276 12455	Push switch tuning up	
ST01 **	4822 276 12455	Push switch FM	
ST02 **	4822 276 12455	Push switch FM mode	
ST03 **	4822 276 12455	Push switch MW	
ST04 **	4822 276 12455	Push switch LW	
ST05 **	4822 276 12455	Push switch memory	
ST06 **	4822 276 12455	Push switch preset 1	
ST07 **	4822 276 12455	Push switch preset 2	
ST08 **	4822 276 12455	Push switch preset 3	
ST09 **	4822 276 12455	Push switch F.D	
ST10 **	4822 276 12455	Push switch preset 4	
ST11 **	4822 276 12455	Push switch preset 5	
ST12 **	4822 276 12455	Push switch preset 6	
ST13 **	4822 276 12455	Push switch 1,2 digit	
ST14 **	4822 276 12455	Push switch preset 7	
ST15 **	4822 276 12455	Push switch preset 8	
ST16 **	4822 276 12455	Push switch preset 9	
ST17 **	4822 276 12455	Push switch preset 0	
ST18 **	4822 276 12455	Push switch tuning down	
ST19 **	4822 276 12455	Push switch tuning up	
SU01	4822 276 11682	Push switch power standby	
VS01 *	4822 130 90432	display FIP7Q8E	
VT01 **	4822 130 90688	display FIP8BYM8	
Z003	4822 157 53889	AM loop ant.	

Capacitors

CA01	4822 125 50384	Cap. trimmer 20PF red
CA08	4822 125 50384	Cap. trimmer 20PF red
G502	4822 111 91393	Cap. compo. 1000PF (8x)
G503	4822 111 91393	Cap. compo. 1000PF (8x)
DA01	4822 125 50416	Var. cap. 2SVC342
DA03	4822 125 50416	Var. cap. 2SVC342

Resistors

G501	4822 111 91399	Res. compo. 100 K1/16 W (4x)
RA13	4822 100 11372	Potm. trimmer 47 K
R210	4822 116 52846	Safety res. 150 Ω 1/4 W
R211	4822 100 11471	Potm. trimmer 100 K
R301	4822 100 11351	Potm. trimmer 10 K
R311	4822 116 52846	Safety res. 150 Ω 1/4 W
R314	4822 100 11351	Potm. trimmer 10 K
R805	4822 116 52846	Safety res. 150 Ω 1/4 W

Transistors

4822 130 42682	DTA144ES
4822 130 60588 *	DTC114ES
4822 130 60495	2SA1309A Q,R
4822 130 42082	2SC1047 C
4822 130 42298	2SC536SP F,G
4822 130 42125	2SD1302 S,T
4822 130 42121	2SK30A Y

ICs

4822 209 71785	LA1266
4822 209 61257	LC6514B-4052
4822 209 83314	LM7000N
4822 209 60826	NJM7812FA
4822 209 71776	TEA5581

Diodes

4822 130 80326 *	LT3D8B
4822 130 32508	RL103E,DSF10C
4822 130 33305	1SS133,1SS176,MA165
4822 130 33697	1SS135
4822 130 80598	RD22JB2,MTZJ22D
4822 130 33948	RD5.6JB2,MTZJ5.6B

Filters

FA01	4822 242 71509	SFL450J3 filter	
F201	4822 242 71135	SFE10.7MS3-A	
F202	4822 242 71135	SFE10.7MS3-A	
LA01	4822 157 52328	MW ant. coil	
LA02	4822 157 52716	MW osc. coil	
LA03	4822 157 52714	LW ant. coil	
LA04	4822 157 52717	LW osc. coil	
LA05	4822 157 53589	Coil 39 MH	
L201	4822 157 60205	FM Det coil	
L801	4822 146 30803	Transf. mains	
X501	4822 242 72333	Crystal 72 MHz	
X502	4822 242 72397	Cer. filter CSB1000D	

Remark:
* Only 70FT650
** Only 70FT670